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THE FEEDING OF GRAIN SORGHUMS TO LIVE STOCK.

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INTRODUCTION.

The most profitable disposal of the large crops of nonsaccharine, or grain, sorghums is a question which confronts many farmers in those sections of the United States where these grains are produced. A small proportion of the growers of these grains may, because of accessibility of markets, sell their grains at a direct profit; but the majority must find other avenues of marketing, and feeding them to live stock is practically the only alternative. Those who fully appreciate the feeding value of these crops will not hesitate to convert them into beef, pork, mutton, milk, or poultry. By marketing the crops in this way both the grain and the roughage are utilized; the manure is returned to enrich the soil; marketing is facilitated; and the farmer's chances for favorable financial outcome may be thereby greatly enhanced.

NOTE.—In those sections of the United States where nonsaccharine sorghums are produced the question as to the most profitable disposal of them confronts many farmers. Hence, the bulletin will be of interest to cattle feeders and farmers generally in the semiarid regions where grain sorghums do better than corn.

The nonsaccharine, or grain, sorghums which have been grown most widely in this country are kafir, milo, feterita, kaoliang, shallu, and durra. These crops are to the Great Plains Region what corn is to the Corn Belt. They may be fed green; both the cured plants and the seed or grain may be fed; or they may be ensiled. It has been demonstrated that the grain sorghums have less feeding value than corn, but the fact that they are heavy yielders in semiarid sections where corn fails more than compensates for the small difference in feeding value.

Closely related to the nonsaccharine sorghums are the saccharine, or sweet, sorghums. While the latter are not as satisfactory feeds as

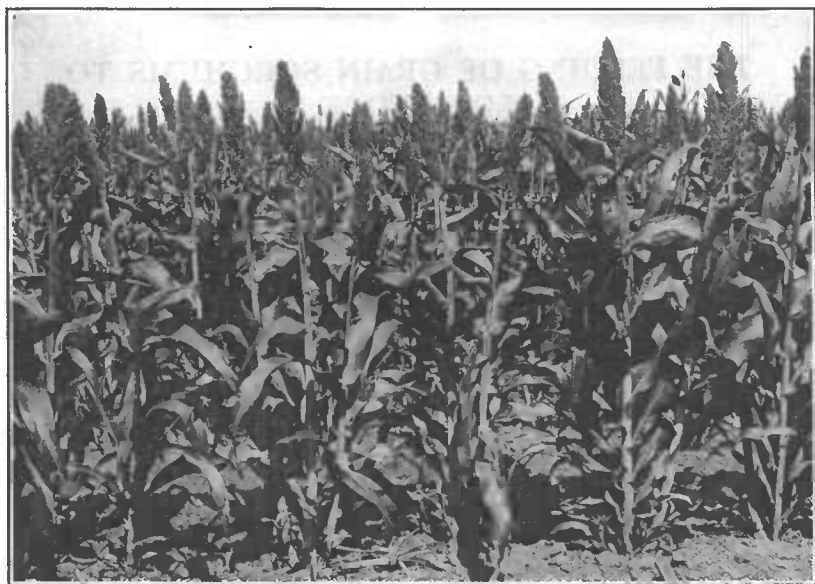


FIG. 1.—A plat of Dwarf Blackhull kafir. This variety matures earlier than standard Blackhull kafir. (From Farmers' Bulletin 552.)

the former, they are valuable in their place in certain sections of the country. The seed of sweet sorghums has been found to be much less palatable and nutritious than that of the nonsaccharine group. Consequently the greatest value of the sweet sorghums as stock feed lies in their use as forages. They produce a palatable hay or fodder (much relished by stock and possessing about the same value as prairie hay.

In the South both classes of sorghums are pastured, particularly the sweet sorghums. The chief danger in the practice lies in the fact that poisoning may occur if stunted or second-growth plants are eaten. This point is more specifically referred to later on.

Some prejudice has existed as to the value of sweet sorghum for silage, based chiefly upon the charge that sorghum silage is highly acid. Experiments do not fully support this view, and stock have been given sorghum silage with splendid results. Owing to its deficiency of grain in comparison with corn, kafir, and milo silage it contains a smaller amount of nutrients per pound.

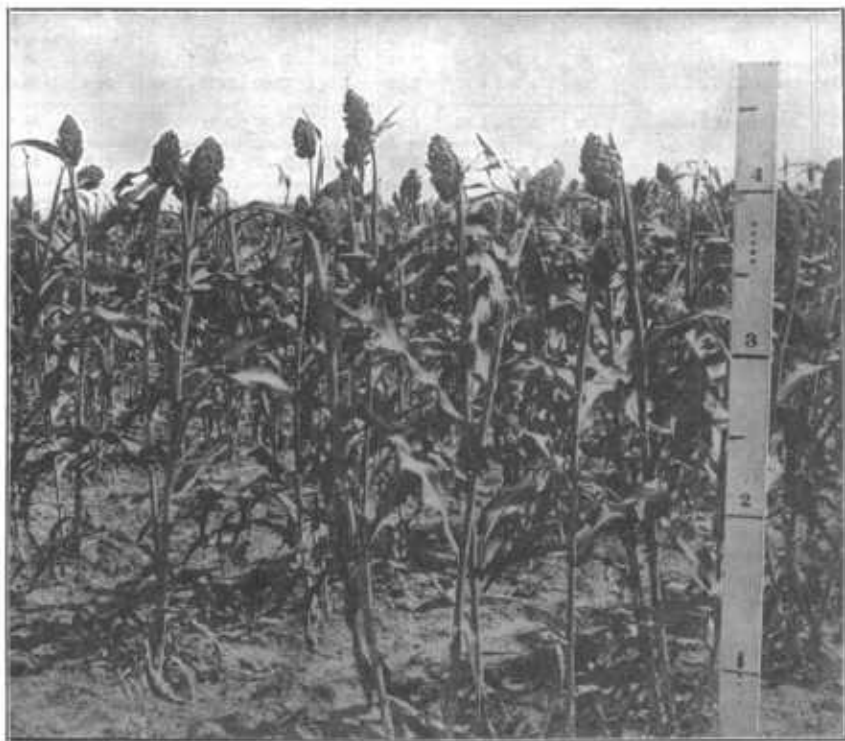


FIG. 2.—A plat of milo, selected for erect heads and low stature. (From Farmers' Bulletin 448.)

COMPOSITION AND DIGESTIBLE NUTRIENTS OF THE GRAIN SORGHUMS.

Chemical analyses of grain sorghums indicate that they are very similar to corn in composition. The fat content of the latter is higher, the protein percentage is greater in the sorghums, while the amounts of carbohydrates are practically equal in both. The following table taken from Farmers' Bulletin 686 shows the chemical analyses of several varieties of grain sorghums grown at the Amarillo station, Texas. The average of many analyses of corn is given for comparison.

TABLE 1.—*Chemical analyses¹ of air-dry samples of various grain-sorghum varieties grown at the Amarillo Cereal Field Station, Amarillo, Tex., 1908 to 1912, inclusive, compared with analyses of dent corn.*

Feed.	Number of analyses.	Water.	Ash.	Nitrogen.	Protein.	Carbohydrates.	Fat.	Fiber.	Weight per—	
									1,000 kernels.	Bushel.
									<i>Grams.</i>	<i>Pounds.</i>
Milo.....	67	9.32	1.62	2.01	12.54	71.89	3.15	1.48	36.1	58.1
Dwarf milo.....	55	9.38	1.63	1.92	12.16	72.09	3.27	1.47	31.4	58.2
Average of 2 milos...	122	9.35	1.62	1.97	12.37	71.97	3.21	1.48	34.0	58.1
Feterita.....	8	9.58	1.72	2.24	14.00	70.32	2.90	1.48	32.2	55.9
Blackhull kafir.....	78	9.58	1.78	2.25	14.10	69.49	3.47	1.58	21.6	58.0
Dwarf blackhull kafir.....	13	9.95	1.70	2.09	13.09	70.49	3.25	1.52	16.6	58.7
Average of 2 kafirs...	91	9.63	1.77	2.23	13.95	66.65	3.43	1.57	20.9	58.1
Red kafir.....	37	9.56	1.73	1.92	12.01	72.03	3.16	1.51	18.5	58.3
Average of 3 kafirs...	128	9.61	1.76	2.14	13.39	70.33	3.35	1.55	20.1	58.2
Shallu ²	10	10.38	1.98	2.42	15.17	66.86	3.69	1.92	15.1	57.9
Average of all varieties....	268	9.52	1.70	2.07	13.01	70.95	3.29	1.53	26.6	58.1
Dent corn ³	86	10.60	1.50	.....	10.30	70.40	5.00	2.20	.....	.....

¹ The analyses were made by the Plant-Chemical Laboratory of the Bureau of Chemistry, U. S. Department of Agriculture.

² Grown only in the years 1911 and 1912.

³ Jenkins and Winton, Compilation of Analyses of American Feeding Stuffs. U. S. Dept. Agr., Office of Experiment Stations Bul. 11, 1892.

The amount of digestible nutrients which grain sorghums contain concerns the feeder more than does the composition. The digestible nutrients, it may be explained, are those compounds which are assimilated and used to produce heat, energy, fat, milk, muscle, and bone. The following table, from Henry and Morrison's "Feeds and Feeding," compares the digestible nutrients in 100 pounds, respectively, of kafir grain and shelled dent corn. Kafir may be taken as a representative of the groups of grain sorghums grown in the United States.

TABLE 2.—*Digestible nutrients in 100 pounds of feed.*

Feed.	Dry matter in 100 pounds.	Digestible nutrients in 100 pounds.			Nutritive ratio.
		Crude protein.	Carbohydrates.	Fat.	
Kafir grain.....	88.2	9.0	65.8	2.3	1:7.9
Dent corn.....	89.5	7.5	67.8	4.6	1:10.4

It is seen that kafir, in comparison with corn, is a little higher in digestible protein, but in carbohydrates and fats, which are the energy and fat producing compounds, it is somewhat lower.

VALUE AND USE OF THE GRAINS.

Horses, mules, cattle, sheep, hogs, and poultry have been fed the grains of these nonsaccharine sorghums with very satisfactory results. Breeding animals or those which are working or being fattened for the block eat properly prepared sorghum grains with much relish. However, as the grains are small and rather hard, grinding or crushing is recommended before feeding, except for sheep and poultry. Sheep masticate the small kernels well, thus rendering them readily accessible to the digestive juices, while poultry feed upon the unbroken grain, which is especially palatable to them in this form. If the grain is not ground for other stock it is less palatable and much of it passes through the digestive tract unbroken; thus much of the total feeding value is lost.

Very often the entire heads are ground up, producing a feed of greater bulk. The resulting meal, called head chop, resembles corn-and-cob meal in food value. It is recommended especially where the supply of roughage is limited, and usually is economical for feeding stock not being finished for market. Head chop is valuable in producing a high finish when supplemented by a rich concentrate such as cottonseed meal.

The quantities to be fed to the different kinds of animals depend upon many factors, such as the amount and kind of roughage and of other concentrates available, age, type, and size of the animals, and for what purpose the stock is being fed. Rations for various classes of stock are hereinafter suggested.

FEEDS RECOMMENDED FOR USE WITH SORGHUM GRAINS.

The feeder always should remember that sorghum grains alone do not form a balanced ration, and the same care which is exercised in feeding corn should be applied when feeding grains of the sorghums. This applies with particular emphasis to the rations for young and growing stock. Some feed which is rich in protein must also be given if favorable results are to follow heavy feeding of this class of grains. Where alfalfa, clover, or other leguminous hay can be had, no addition of protein-rich concentrates is necessary. Otherwise the ration should be balanced by adding some feed furnishing considerable protein. Cottonseed meal or cake and linseed meal have been most widely used for this purpose. Skim milk or tankage can be used to balance the pig's ration. Often other protein-rich feeds which supply the much-needed nitrogenous matter, such as soy-bean meal,

peanut meal, brewers' grains, etc., are available on the farm and may be profitably fed in connection with the sorghum grains. Maximum growth and development are attained in animals only where this attention to protein supply is given to the ration, and dairy cows fall far below their milking capacity when their rations are deficient in protein. A most liberal supply of the sorghum grains will not produce a first-class animal if it is not supplemented by some feed which carries a comparatively large amount of protein. Thus by an intelligent use of available feedstuffs the farmer can utilize the bulk of the roughage on his farm, feed the sorghum grains as the basis of properly balanced rations, and put beef, pork, mutton, and dairy products on the market which rank with the finest.

Since their introduction into this country the sorghum grains have been fed successfully to poultry. Most of the prepared poultry feeds which are offered on the market contain more or less of the grains of the sorghums. The grains do not require grinding, and are relished greatly by poultry, while they supply the energy and fat producing compounds in a desirable form.

VALUE OF THE SORGHUMS AS FORAGE.

The nonsaccharine sorghums may be utilized as forage in the form of stover and fodder or they may be put into silos. For these purposes the grain sorghums compare quite favorably with corn. Thus the grower may utilize the entire crop by feeding both the grain and the plant proper.

Well-cured stover and fodder from kafir, milo, etc., are well liked by live stock, and in some sections these constitute practically the sole roughage which the stock receive during the winter. Cattle can be well wintered at small expense on straw, fodder, or stover from the grain sorghums with a small allowance of some feed rich in protein. Linseed meal, bran, oats, or leguminous hay should be fed with the roughage to young stock, so that good growth will follow.

USE OF SILAGE ECONOMICAL.

As with corn, silage is perhaps the most economical form in which the grain sorghum crops may be utilized. Sorghum silage is very much liked by sheep and cattle, and its use in the rations of these classes of stock is very desirable. When cut at the proper stage it has a feeding value practically equal to that of corn silage. The grain sorghums should be cut for silage at the time the seeds are in the stiff dough stage. Silage is particularly useful in the ration of cattle to aid in keeping the body in proper tone and to increase the animal's appetite; thus by feeding silage the feeder and stockman are able to realize the maximum benefit from their crops of grain sorghums. The amount to be fed varies from a few pounds for a calf

up to 40 or 50 pounds or even more for a heavy producing dairy cow or a heavy steer. The amount of silage fed is affected by the kind of stock being fed and by the other components of the ration.

Silage is especially valuable when given liberally to stocker cattle. For animals that are producing heavily, silage should not be depended upon to supply the bulk of the nutrients which they require, as it is not a concentrate and contains a high percentage of water. A liberal addition of concentrates should be fed with it. By "producing animals" is meant dairy cows, working horses, and fattening animals, all of which are converting some of their feed into milk, work, or fat. In view of these advantages which silage feeding offers, growers of grain sorghums should endeavor to feed these crops in the form of silage as much as possible. A great number of experiments with cattle and sheep conducted under supervision of the

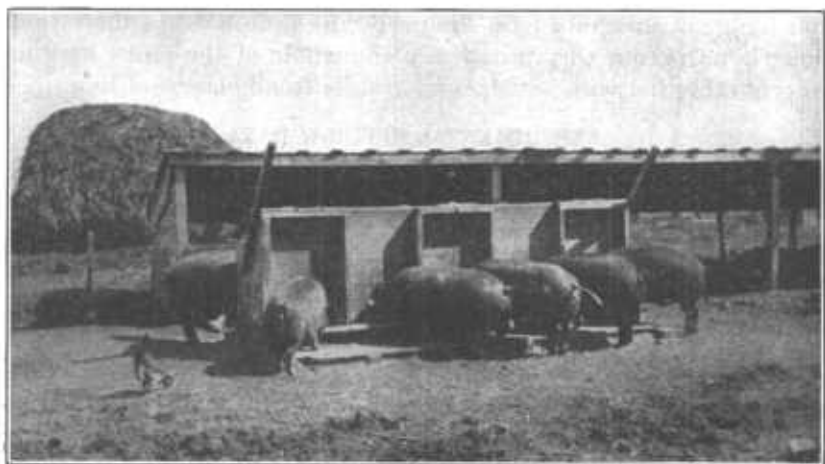


FIG. 3.—Fattening pigs on milo maize, using self-feeder.

Department and State stations fully substantiate this advice. Farmers' Bulletin 578 of the Department of Agriculture, which may be had upon request, gives detailed information concerning the handling and feeding of silage.

PRECAUTIONS TO BE TAKEN IN FEEDING GRAIN SORGHUMS.

Sometimes stock are killed by being pastured upon stunted or "second growth" plants of either sweet sorghums or nonsaccharine sorghums. Stunted plants may be caused by extreme drought or other adverse conditions. At such stages of growth prussic acid, a deadly poison, sometimes accumulates in the plant tissue, and consequently the stock may suffer severe poisoning, which is usually fatal. The plants have this poisonous property only under the conditions mentioned, and all losses may be avoided with a little care

on the part of the farmer. No losses have been reported from poisoning in feeding grain, heads, silage, hay, fodder, or stover of the nonsaccharine sorghums.

Some feeders have found that the sorghum grains, if fed heavily, produce a constipating effect upon stock. While this is not regarded as dangerous, it is well always to feed with them some material which is slightly laxative, such as linseed meal, bran, alfalfa, or soy beans. In this connection oat straw is also a valuable supplement.

Moldy grain-sorghum feeds in all forms should be avoided as much as possible, for more or less risk always attends the use of moldy feeds. Because of this the farmer should endeavor to harvest and store his crops with a view to minimizing this trouble. Farmers' Bulletin 686 furnishes information relative to the correct methods of harvesting and storing of sorghum crops.

If feeders will observe these precautions and supplement the grain and forage of the grain with the proper feeds to balance the rations, there is no reason why practically the whole of the crops may not be profitably fed with satisfactory results to all classes of live stock.

EXPERIMENTAL FEEDING DATA.

A number of practical cattle-feeding tests recently have been carried on in the Texas Panhandle region, under supervision of a field agent of the Bureau of Animal Industry. In these tests the grain sorghums were fed to beef cattle in a variety of forms and combinations and in most cases formed the bulk of the rations fed. The data gathered from this work indicate clearly the efficiency of the grain-sorghum feeds in the form of chop, head chop, silage, fodder, and stover, both in wintering cattle and in finishing them for the block. Silage of the grain sorghums, when fed as shown in Table 3, was found to be very beneficial for increasing the appetites of feeders, keeping them in fine condition, and adding a high finish. Cottonseed meal is very efficient as a supplement to kafir and milo feeds, and especially in conjunction with silage. Table 3 summarizes the results of this work.

TABLE 3.—*Results of use of grain sorghums in feeding tests carried out on Texas farms in cooperation with the U. S. Department of Agriculture, 1914-15.*

Age of cattle.	Number fed.	Date of feeding.	Length of feeding period.	Daily ration per head on full feed.	Total average gain per head.	Average daily gain per head.
			Days.		Pounds.	Pounds.
(1) 2 years.....	127	Oct. 28 to Feb. 2.....	97	Cottonseed meal; ¹ kafir chops; ¹ silage.	222	2.39
(2) 3 years.....	200	Jan. 1 to May 1.....	120	Sorghum fodder; ¹ cottonseed meal, 6 pounds; kafir chops, 8 pounds; silage, 40 pounds.	330	1.84
(3) 3 years.....	32	.....	165	Cottonseed meal, 4 pounds; milo chops, 18 pounds; silage, 40 pounds; sorghum butts. ²	289	1.75
(4) 3 years.....	68	Jan. 17 to July 3.....	167	Cottonseed meal, 6 pounds; silage, 60 pounds; bundled kafir, 6 pounds.	292	1.75
(5) 20 months.....	90	Nov. 1 to Feb. 12.....	102	Cottonseed meal, 4½ pounds; silage, 30 pounds; wheat straw. ²	213	2.08
(6) Steer calves.....		Dec. 1 to Apr. 16.....	136	Cottonseed meal, 3 pounds; kafir chops, 5 pounds; silage, 20 pounds; straw. ²	240	1.76
(7) Steer calves.....	63	Oct. 31 to June 4.....	214	Cottonseed meal, 2½ pounds milo chops, 10 pounds; silage, 20 pounds; wheat straw. ²	332	1.65
(8) Heifer calves.....	116	Oct. 31 to May 1.....	180	Cottonseed meal, 2 pounds; milo chops, 5 pounds; silage, 25 pounds; wheat straw. ²	249	1.38
(9) Heifer calves.....	126	Winter.....	180	Cottonseed meal, 1½ pounds; milo chops, 5 pounds; silage, 25 pounds; straw. ²	248	1.38
(10) Calves.....		December - March, wintered only.	105	Cottonseed meal, ¹ silage, ¹ straw. ²	149	1.42

¹ Amounts not given.² Were given all they would eat.

On the whole the results in Table 3 indicate that the grain sorghums are efficient beef producers. The use of cottonseed meal and silage in all the rations is noticeable. These two feeds form an extremely palatable and efficient combination, and are conveniently fed together. The meal is usually mixed with the silage as it is fed. Dry roughages, such as straw, stover, and fodder, are readily eaten in connection with silage and cottonseed meal; thus the maximum amount of roughage may be utilized to advantage. Experiments Nos. 4, 5, and 10 in Table 3 illustrate these points well. If cottonseed meal is excessively high in price, it may be more economical to feed smaller

quantities than are indicated in these rations; but if no leguminous hay or other protein-rich concentrate is available it is advisable to feed some cottonseed meal to balance the ration. The increased growth and gain and the higher finish produced by its use justify the added cost of feeding it. The rations for beef cattle on page 12 are suggested with the high price of cottonseed meal in view. The amounts of grain sorghum in a ration should be increased when the allowance of cottonseed meal is cut down. One pound of cottonseed meal is usually considered equal in nutritive value to two pounds of sorghum-grain chop.

The State experiment stations at Manhattan, Kans., Stillwater, Okla., and College Station, Tex., have carried on feeding experiments

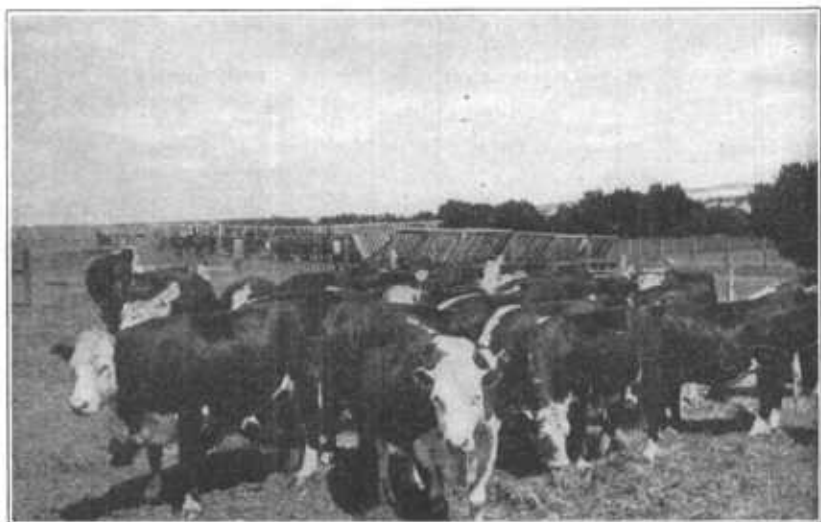


FIG. 4.—Two-year-old steers which topped the Kansas City market. Fed grain sorghum and cottonseed meal.

with various classes of live stock in which the grain sorghums formed a large part of the rations fed.

The Kansas station reports the economical use of kafir silage, wheat straw, and a small amount of cottonseed meal for wintering beef steers. Ground kafir and alfalfa hay were used very successfully for fattening steers. When no protein-rich concentrates or roughages were fed with ground kafir unsatisfactory gains followed. The Texas station has found that a mixture of about 4 parts of ground kafir or milo and one part cottonseed meal fed with cottonseed hulls and sorghum hay or kafir stover produced excellent gains. A larger amount of sorghum grain was fed than is customary in the case of corn. For example, a lot of 3-year-old steers were given a ration composed of 21 pounds ground kafir, 4 pounds cottonseed meal, and

all the kafir stover they would eat. These steers made an average daily gain of 3.1 pounds a head during a period of 85 days.

The Kansas and Oklahoma stations fed ground kafir with a large amount of alfalfa hay to dairy cows with good results at the pail and in condition of the cows. When the alfalfa hay was substituted by timothy, prairie hay, kafir fodder, or sorghum hay, milk production was seriously cut down, owing to the lack of protein in such combinations. Silage from grain sorghums in the rations of dairy cows proved practically as valuable as corn silage.

At the Kansas station pigs were fed ground kafir and milo supplemented by tankage and shorts, soy-bean meal, and alfalfa, with excellent results. In these experiments the largest and cheapest

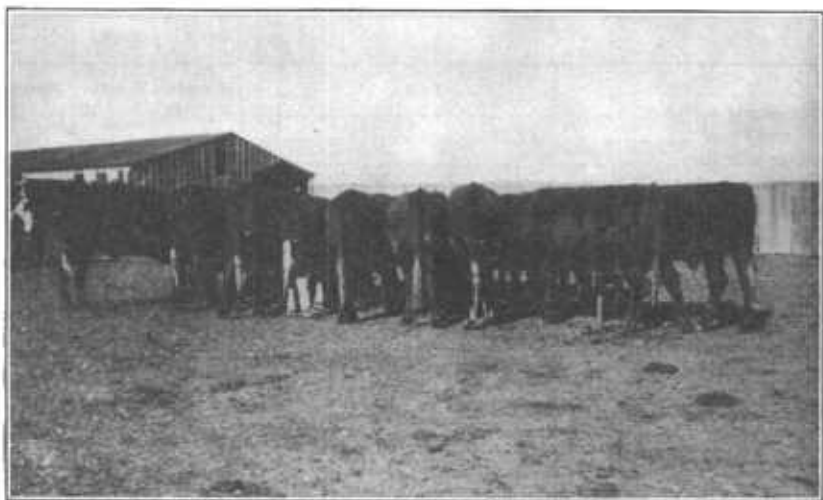


FIG. 5.—Steers in Texas Panhandle fed on milo-maize silage and cottonseed meal.

gains were produced by the ration in which shorts and tankage formed the supplements. Where sorghum grains have been properly supplemented by protein-rich feeds, they have produced only 2 to 10 per cent less gains than the same amount of corn would furnish.

Lambs were fed at the Kansas station, both whole and ground kafir being used with cottonseed meal. The gains secured indicate that the feeding value of these grains is slightly less than that of corn. Grinding the kafir for sheep and lambs did not pay.

Horses and mules have been fed the sorghum grains at the Oklahoma station, and the results indicate that for such stock these feeds are palatable and nutritious, and are also economical in regions where they grow better than corn. The experience of farmers who have long used these feeds for their horses and mules is in harmony with these reports.

SUGGESTED RATIONS FOR VARIOUS KINDS OF LIVE STOCK.

While no standard combination of feeds can be given which will apply economically to all sections where grain sorghums are grown extensively, the following rations are suggested for various classes of live stock. These are meant merely to serve as guides in formulating rations, and they may be varied to suit local conditions. The point in them which it is desired to emphasize is the profitable consumption of both grains and roughages in sections where the grain sorghums necessarily form the basis of the rations.

Daily rations for fattening steer weighing about 1,000 pounds.

Feed.	Ration.		
	No. 1.	No. 2.	No. 3.
	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>
Kafir chop or milo chop	12	15	12
Cottonseed meal	2 to 3	.....	3
Kafir or milo silage	25	.....	40 to 45
Kafir and milo stover ³ or straw	(1)	(2)	(1)
Alfalfa hay .....	.....	8	.....

¹ Give all they will eat.

² 5 pounds or more.

³ "Stover" means the cured plants after the heads have been removed.

Daily rations for wintering beef cattle 1,000 pounds in weight.

Feed.	Ration.		
	No. 1.	No. 2.	No. 3.
	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>
Kafir or milo head chop	3	.....	3
Cottonseed meal .....	.....	1½	.....
Kafir or milo silage	25	40	.....
Alfalfa hay .....	.....	.....	8
Kafir or milo stover or straw	8 to 10	5	10 to 12

Sorghum hay may be used in place of some of the fodder or straw in these rations. Such roughage is usually fed in racks, so the cattle may eat all they want. In the fattening rations the proportion of roughage to concentrates should be much greater at the beginning of the feeding period than shown in the table above. Always put animals on full feed gradually. Toward the close of the fattening process the amounts of grain may often be increased to 17 pounds, or even more, and the proportion of roughage lowered accordingly. For smaller or larger animals decrease or increase the ration in proportion to size.

Daily rations for farm milk cow weighing about 900 pounds and producing 16 pounds of milk daily.

Feed.	Rations.	
	No. 1.	No. 2.
	<i>Pounds.</i>	<i>Pounds.</i>
Kafir chop or milo chop.....	3	8
Cottonseed meal.....	1	.....
Alfalfa hay.....	12	16
Sorghum hay, stover, or straw.....	5	5
Kafir or milo silage.....	30	.....

Cows which are giving milk must be fed generously if they are expected to produce well. More protein-rich feeds must be supplied in the ration than is necessary in rations for fattening stock or those being wintered. Many leguminous hays may be substituted for alfalfa. If no such hay is available, it is necessary to use a protein-rich concentrate. Cottonseed meal is perhaps the most reasonable feed of this class to purchase in the Southwest. Silage is also especially valuable as a dairy feed, and its use is strongly recommended.

Daily rations for a 1,200 to 1,400 pound horse doing moderate work.

Feed.	Rations.	
	No. 1.	No. 2.
	<i>Pounds.</i>	<i>Pounds.</i>
Kafir or milo chop.....	12	10
Alfalfa hay.....	10	.....
Kafir or milo stover or straw.....	6	6
Sorghum hay.....	.....	10
Cottonseed meal.....	.....	1

The amounts shown in these rations should be varied to agree with the size of the horse and the kind of work he is doing.

Daily rations for fattening hogs weighing 100 pounds.

Feed.	Rations.	
	No. 1.	No. 2.
	<i>Pounds.</i>	<i>Pounds.</i>
Kafir or milo chop.....	3 to 4	3 to 4
Soy-bean meal.....	$\frac{1}{2}$ to $\frac{3}{4}$	.....
Tankage.....	.....	$\frac{1}{4}$ to $\frac{1}{2}$

Ground alfalfa instead of soy-bean meal or tankage may be used with sorghum grains to furnish protein. Ration No. 2 would probably produce pork of better quality.

Daily rations for breeding sows per 100 pounds weight.

Feed.	Rations.	
	No. 1.	No. 2.
	<i>Pounds.</i>	<i>Pounds.</i>
Kafir or milo chop	1½ to 2½	3
Soy-bean meal or tankage	½ to ¾	.....
Ground alfalfa	½ to 1	1½

Skim milk or leguminous pasture may often profitably supply the protein required, in which case the tankage and soy-bean meal are eliminated. Protein and mineral matter should not be neglected in the rations of any breeding animal.

Daily rations for fattening sheep 100 pounds in weight.

Feed.	Rations.		
	No. 1.	No. 2.	No. 3.
	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>
Kafir or milo	1½	1½	1
Cottonseed meal	¾	.....	¾
Alfalfa hay .....	.....	2	.....
Sorghum hay	3	.....	1
Kafir or milo silage .....	.....	2	3

These rations should be varied according to the size of the lambs or sheep being fed and to conditions under which the feeding operations are being carried on. Near the close of the feeding period the amount of roughage shown above will usually need to be reduced.

It is to be remembered that the above are not given as perfectly balanced rations, and it will be advantageous in many cases for the feeder to substitute other available materials for some which are given. Furthermore, kafir and milo mentioned in the above rations may be replaced by the other nonsaccharine sorghums and practically the same returns realized. In suggesting these rations, however, attention has been given to the proportion of concentrates to roughages and to the amount of protein which the animals require.

Further information relative to the adaptability, cultivation, care, and use of the grain sorghums may be obtained by applying for publications in the list which follows.

**PUBLICATIONS OF THE U. S. DEPARTMENT OF AGRICULTURE RELATING
TO GRAIN SORGHUMS AND TO FEEDING OF LIVE STOCK.**

AVAILABLE FOR FREE DISTRIBUTION.

Feeding Farm Animals. (Farmers' Bulletin 22.)
Principles of Horse Feeding. (Farmers' Bulletin 170.)
Milo as a Dry-land Grain Crop. (Farmers' Bulletin 322.)
Forage Crops for Hogs in Kansas and Oklahoma. (Farmers' Bulletin 331.)
Computation of Rations for Farm Animals by the Use of Energy Values. (Farmers' Bulletin 346.)
Feeding Hogs in the South. (Farmers' Bulletin 411.)
Better Grain-sorghum Crops. (Farmers' Bulletin 448.)
Kafir as a Grain Crop. (Farmers' Bulletin 552.)
Use of Corn, Kafir, and Cowpeas in the Home. (Farmers' Bulletin 559.)
Making and Feeding of Silage. (Farmers' Bulletin 578.)
Beef Production in the South. (Farmers' Bulletin 580.)
Economical Cattle Feeding in the Corn Belt. (Farmers' Bulletin 588.)
Uses of Sorghum Grain. (Farmers' Bulletin 686.)

FOR SALE BY THE SUPERINTENDENT OF DOCUMENTS.

Nonsaccharine Sorghums. (Farmers' Bulletin 288.) Price, 5 cents.
The History and Distribution of Sorghums. (Bureau of Plant Industry Bulletin 175.) Price, 10 cents.
The Importance and Improvement of the Grain Sorghums. (Bureau of Plant Industry Bulletin 203.) Price, 10 cents.
Grain-sorghum Production in the San Antonio Region of Texas. (Bureau of Plant Industry Bulletin 237.) Price, 5 cents.
The Kaoliangs: A New Group of Grain Sorghums. (Bureau of Plant Industry Bulletin 253.) Price, 15 cents.
Cereal Experiments in the Texas Panhandle. (Bureau of Plant Industry Bulletin 283.) Price, 10 cents.
Feterita, a New Variety of Sorghum. (Bureau of Plant Industry Circular 122-C.) Price, 5 cents.
The Feeding Value of Cereals as Calculated from Chemical Analyses. (Bureau of Chemistry Bulletin 120.) Price, 10 cents.